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ANNUAL REPORT

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MUSEUM OF COMPARATIVE ZOOLOGY

AT HARVARD COLLEGE

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

1921-1922.

CAMBRIDGE, U. S. A.:

PRINTED FOR THE MUSEUM.

1922.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EAST-ERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION:—

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| <p>A. AGASSIZ. V.⁵ General Report on the Expedition.</p> <p>A. AGASSIZ. I.¹ Three Letters to Geo. M. Bowers, U.S. Fish Com.</p> <p>H. B. BIGELOW. XVI.¹⁶ The Medusae.</p> <p>H. B. BIGELOW. XXIII.²³ The Siphonophores.</p> <p>H. B. BIGELOW. XXVI.²⁶ The Ctenophores.</p> <p>R. P. BIGELOW. The Stomatopods.</p> <p>O. CARLGRÉN. The Actinaria.</p> <p>R. V. CHAMBERLIN. XXXI.³¹ The Annelids.</p> <p>H. L. CLARK. XXXIII.³³ The Holothurians.</p> <p>H. L. CLARK. XXXII.³² The Starfishes.</p> <p>H. L. CLARK. XXX.³⁰ The Ophiurans.</p> <p>S. F. CLARKE. VIII.⁸ The Hydroids.</p> <p>W. R. COE. The Nemerteans.</p> <p>L. J. COLE. XIX.¹⁹ The Pycnogonida.</p> <p>W. H. DALL. XIV.¹⁴ The Mollusks.</p> <p>C. R. EASTMAN. VII.⁷ The Sharks' Teeth.</p> <p>S. GARMAN. XII.¹² The Reptiles.</p> <p>H. J. HANSEN. The Cirripeds.</p> <p>H. J. HANSEN. XXVII.²⁷ The Schizopods.</p> <p>W. E. HOYLE. The Cephalopods.</p> <p>W. C. KENDALL and L. RADCLIFFE. XXV.²⁵ The Fishes.</p> | <p>C. A. KOFOID. III.³ IX.⁹ XX.²⁰ The Protozoa.</p> <p>C. A. KOFOID and J. R. MICHENER. XXII.²² The Protozoa.</p> <p>C. A. KOFOID and E. J. RIGDEN. XXIV.²⁴ The Protozoa.</p> <p>P. KRUMBACH. The Sagittae.</p> <p>R. VON LENDENFELD. XXI.²¹ The Siliceous Sponges.</p> <p>R. VON LENDENFELD. XXIX.²⁹ Hexactinellida.</p> <p>G. W. MÜLLER. The Ostracods.</p> <p>JOHN MURRAY and G. V. LEE. XVII.¹⁷ The Bottom Specimens.</p> <p>MARY J. RATHBUN. X.¹⁰ The Crustacea Decapoda.</p> <p>HARRIET RICHARDSON. II.² The Isopods.</p> <p>W. E. RITTER. IV.⁴ The Tunicates.</p> <p>G. O. SARS. The Copepods.</p> <p>F. E. SCHULZE. XI.¹¹ The Xenophyphoras.</p> <p>HARRIET R. SEARLE. XXVIII.²⁸ Isopods.</p> <p>H. R. SIMROTH. Pteropods, Heteropods.</p> <p>E. C. STARKS. XIII.¹³ Atelaxia.</p> <p>TH. STUDER. The Alcyonaria.</p> <p>JH. THIELE. XV.¹⁵ Bathysciadium.</p> <p>T. W. VAUGHAN. VI.⁶ The Corals.</p> <p>R. WOLTERECK. XVIII.¹⁸ The Amphipods.</p> |
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¹ Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.

² Bull. M. C. Z., Vol. XLVI., No. 6, July, 1905, 4 pp., 1 pl.

³ Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.

⁴ Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 22 pp., 3 pls.

⁵ Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.

⁶ Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.

⁷ Bull. M. C. Z., Vol. L., No. 4, November, 1906, 26 pp., 4 pls.

⁸ Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 20 pp., 15 pls.

⁹ Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 18 pls.

¹⁰ Mem. M. C. Z., Vol. XXXV., No. 2, August, 1907, 56 pp., 9 pls.

¹¹ Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.

¹² Bull. M. C. Z., Vol. LI., No. 1, June, 1908, 14 pp., 1 pl.

¹³ Bull. M. C. Z., Vol. LII., No. 2, July, 1908, 8 pp., 5 pls.

¹⁴ Bull. M. C. Z., Vol. XLIII., No. 6, October, 1908, 285 pp., 22 pls.

¹⁵ Bull. M. C. Z., Vol. LII., No. 5, October, 1908, 11 pp., 2 pls.

¹⁶ Mem. M. C. Z., Vol. XXXVII., February, 1909, 243 pp., 48 pls.

¹⁷ Mem. M. C. Z., Vol. XXXVIII., No. 1, June, 1909, 172 pp., 5 pls., 3 maps.

¹⁸ Bull. M. C. Z., Vol. LII., No. 9, June, 1909, 26 pp., 8 pls.

¹⁹ Bull. M. C. Z., Vol. LII., No. 11, August, 1909, 10 pp., 3 pls.

²⁰ Bull. M. C. Z., Vol. LII., No. 13, September, 1909, 48 pp., 4 pls.

²¹ Mem. M. C. Z., Vol. XLI., August, September, 1910, 323 pp., 56 pls.

²² Bull. M. C. Z., Vol. LIV., No. 7, August, 1911, 38 pp.

²³ Mem. M. C. Z., Vol. XXXVIII., No. 2, December, 1911, 232 pp., 32 pls.

²⁴ Bull. M. C. Z., Vol. LIV., No. 10, February, 1912, 16 pp., 2 pls.

²⁵ Mem. M. C. Z., Vol. XXXV., No. 3, April, 1912, 98 pp., 8 pls.

²⁶ Bull. M. C. Z., Vol. LIV., No. 12, April, 1912, 38 pp., 2 pls.

²⁷ Mem. M. C. Z., Vol. XXXV., No. 4, July, 1912, 124 pp., 12 pls.

²⁸ Bull. M. C. Z., Vol. LVIII., No. 8, August, 1914, 14 pp.

²⁹ Mem. M. C. Z., Vol. XLII., June, 1915, 397 pp., 109 pls.

³⁰ Bull. M. C. Z., Vol. LXI., October, 1917, 28 pp., 5 pls.

³¹ Mem. M. C. Z., Vol. XLVIII., July, 1919, 514 pp., 80 pls.

³² Mem. M. C. Z., Vol. XXXIX., No. 3, February, 1920, 46 pp., 6 pls.

³³ Mem. M. C. Z., Vol. XXXIX., No. 4, September, 1920, 40 pp., 4 pls.

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OUTRAM BANGS . . . *Curator of Mammals and Birds.*

HUBERT L. CLARK . . . *Curator of Echinoderms.*

HENRY B. BIGELOW . . . *Curator of Coelenterates.*

ROBERT W. SAYLES . . . *Curator of the Geological Collections.*

PERCY E. RAYMOND . . . *Curator of Invertebrate Palaeontology.*

THOMAS BARBOUR . . . *Associate Curator of Reptiles and Amphibians.*

RALPH V. CHAMBERLIN . . . *Curator of Arachnids, Myriopods, and Worms.*

JOHN C. PHILLIPS . . . *Associate Curator of Birds.*

NATHAN BANKS . . . *Curator of Insects.*

GEORGE NELSON . . . *Preparator.*

REGINALD A. DALY . . . *Sturgis Hooper Professor of Geology.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

THE Museum is indebted to Mr. George R. Agassiz for a portrait-bust in bronze of his father, Alexander Agassiz; the bust, heroic in size, the work of Paul Bartlett, perpetuates with exceptional faithfulness the characteristic dignity and power of Mr. Agassiz.

Field-work undertaken by, or in the interest of, the Museum, has been carried on in China, the Philippines, Africa, the West Indies, Mexico, and Central and North America.

Dr. R. V. Chamberlin spent the month of August, 1921, in Utah, collecting, as in recent years, material for a review of the myriopod and arachnid fauna of Utah.

Working in the vicinity of Sebastian, Florida, during the winter and early spring of 1922, Mr. George Nelson secured some interesting amphibians and arachnids.

Dr. Thomas Barbour spent the spring of 1922 in eastern Panama, a region largely unexplored zoologically. With the assistance of Messrs. W. S. Brooks and C. L. Underwood, very considerable series of mammals, birds, and reptiles were secured. Dr. Barbour and Mr. Brooks also visited Cuba and Costa Rica.

Mr. J. L. Peters's work in the West Indies, made possible through the generosity of Dr. Barbour, yielded a representative series of birds and reptiles from the islands of Anguilla, Saint Eustatius, Saint Christopher, and Nevis.

While engaged in ornithological work in Mexico, Mr. W. W. Brown, Jr. collected on several occasions series of reptiles which Dr. Barbour has added to the ever increasing stores of the department in his charge.

For several years Mr. George Schwab has devoted such spare hours as could be taken from his missionary labors in the Cameroons, to scientific work. Much of this work has contributed to the increase and value of the Museum's series of African vertebrates. During the present year the Museum has received from

Mr. Schwab some anthropoids, skins and skeletons, and a number of birds and reptiles, including several rare forms, not previously represented in the collections.

The extent and value of the Museum's collections of Philippine mollusks and birds is due to the liberal interest of former Governor-General W. Cameron Forbes. Serving with General Leonard Wood on a tour of inspection for the United States, Mr. Forbes visited, during the spring and summer of 1921, very many of the islands of the Archipelago, and obtained for the Museum a series of birds, which, with two collections, the result of previous work, contains many species new to science and to the Museum.

The value of the zoölogical collections made in 1915 in British East Africa and Madagascar by Mr. F. R. Wulsin was so great that the result of his work in China, undertaken in behalf of the Museum during 1921 and 1922, was anticipated with keen interest. The material already received is almost entirely vertebrates, many of which are new to the Museum, with others useful for comparative study with forms from adjoining regions.

Mr. T. H. Clark, continuing his field-studies in the vicinity of Quebec and Levis, collected a large series of Ordovician and Devonian fossils, most of which he has identified and labeled. A number of new species and a large series of well-preserved graptolites are included in Mr. Clark's collection.

Mr. R. W. Sayles engaged in a field-study of the conglomerates at Levis, Quebec, and in Vermont at St. Albans and Swanton.

Dr. G. M. Allen has continued the work on the fossil mammals collected in the western United States in the early eighties by Mr. Samuel Garman; the repair, preliminary development, and identification of this material, except a comparatively small portion, chiefly Camelidae and Cervidae, is completed. Dr. Allen keeps all accessions catalogued, labeled, and with provisional identifications, attends to loans and exchanges, aids visiting investigators in their studies, while carrying on studies of his own.

Of the more notable additions to the collection of mammals, mention may be made of two nearly complete skeletons of *Moropus cookii* E. H. Barbour, an odd-toed ungulate of unique skeletal characters, typical of an order practically unrepresented in the Museum. For this most valuable accession and for a desirable

series of mammals, birds, and reptiles from Spain, the Museum is indebted to Dr. Thomas Barbour.

For the exhibition series of North American mammals, Mr. George Nelson has under way two fine examples of Moose; one, the gift of Dr. C. A. Thomas, taken in the Cains River district, New Brunswick, by Dr. Thomas in 1914, measures 69 inches at the withers, with antlers showing 22 points and a spread of 44 inches; it is in especially good pelage. The second, from the Kenai Peninsula, Alaska, collected in the fall of 1919 by Mr. Heyward Cutting, is of enormous size, 75½ inches at the withers, with a very fine head, antlers 63 inches and 37 points. In each case Mr. Nelson has, with characteristic skill, given individuality of pose and expression to the mounts. The Museum is greatly indebted to Dr. Thomas and Mr. Cutting for so signal additions to its exhibition collections.

Mr. W. F. Clapp, continuing his work on the Mollusca, has catalogued, labeled, and revised the identifications of the year's accessions. The Shurtleff collection, the gift of Dr. Carleton Shurtleff Francis, the most important accession received, is especially rich in specimens of *Cypraea* and *Conus*; the collection was begun and continued by Dr. Francis's grandfather and uncle, Dr. Samuel Atwood Shurtleff and Dr. Augustine Shurtleff.

Of the more important accessions not already referred to, the following may be mentioned:—

From Col. John E. Thayer, a series of Arctic mammals.

From Mr. T. E. Penard, the types of *Galbula surinamensis* F. P. & A. P. Penard and *Heteroglaucis philippinae* T. E. Penard.

From Dr. George Hills Francis and Dr. Carleton Shurtleff Francis, the collection of nests and eggs of North American birds formed by their brother, the late Nathaniel Atwood Francis, a large series, well prepared, with accurate data.

From Mr. Arthur Loveridge, reptiles and amphibians from Tanganyika.

From Wellesley College, (Mr. A. P. Morse), the termite collection of the late Prof. C. B. Thompson.

From the Museum d'Histoire Naturelle Paris, (M. L. Fage), a large and authentically identified series of European spiders.

From Dr. R. V. Chamberlin, his collection of arachnids and

myriopods accumulated previous to his Museum appointment in 1913.

From Capt. Gilbert Archey, paratypes of recently described chilopods.

From Prof. Graf Carl Attems, a collection of 409 species, 948 specimens of Old World myriopods; this collection contains the types of 162 species described by Attems, one of the chief authorities on myriopods.

From Mrs. N. A. Clapp, a series of Cerionidae, containing a large number of cotypes.

From the National Research Council (Committee on Marine Piling Investigations) a large number of wood-boring Mollusca.

From Dr. E. L. Mark, an extremely fine specimen of *Pyrosoma atlanticum* Peron.

The scientific library of the late Dr. George F. Becker, (estimated at about 1,000 volumes and 2,500 pamphlets), a gift of Mrs. Campbell Forrester, (Dr. Becker's widow), to Harvard University, has been received. This library will not be kept intact, the zoölogical and geological works will be added to the Museum library, those on physics, mathematics, and allied sciences, a very considerable part of the whole, will be retained in the general or departmental libraries. It should be stated that this division has received Mrs. Forrester's approval. Thus far somewhat more than 600 titles have been added to the Museum library from the Becker library.

The Museum has acquired the scientific correspondence of the late Dr. P. R. Uhler, a leading American entomologist officially associated with the Museum in 1864-1867.

Prof. E. L. Bouvier has returned the series of BLAKE Crustacea so long in his hands for study and report. The text, accompanied with exquisite plates drawn under the supervision of the author, was received with the collection. The Museum is fortunate in entrusting the execution of the plates to Mr. E. J. Meisel, who has already finished the twelve plates for the first of the two Memoirs. Professor Bouvier's Memoirs complete the series of reports based on the collections of the BLAKE, with the exception of an elaborate Memoir on the Alcyonaria by Prof. A. E. Verrill. A small installment of the text for Professor Verrill's Memoir has been re-

ceived; the edition for the 140 plates was completed some years ago.

The Library contains 59,846 volumes and 65,253 pamphlets; 1,207 volumes and 3,108 pamphlets have been received during the year.

The publications for the year include one number of the *Memoirs*, six numbers of the *Bulletin*, and the *Annual Report*, a total of 417 (64 quarto and 353 octavo) pages illustrated by 41 (26 quarto, and 15 octavo) plates. The *Memoir* gives a detailed systematic account of the genus *Sphaerodactylus*; one number of the *Bulletin* contains a report on the exploration of the coastal water off the northeastern United States in 1916 by the *GRAMPUS*, and five numbers of the *Bulletin* are based on Museum collections.

The Museum is indebted to Dr. Thomas Barbour for the plates illustrating his *Memoir* on *Sphaerodactylus*, and also for extra service in the preparation of a very considerable amount of mammalian osteological material.

For voluntary work upon the collections of spiders and birds the Museum is indebted to Miss E. B. Bryant and Mr. T. E. Penard.

SAMUEL HENSHAW,
Director.

REPORT ON THE MAMMALS.

BY OUTRAM BANGS.

During the year 625 specimens were received.

The largest collection, 92 specimens, is from eastern Panama, made by Dr. Thomas Barbour, Messrs. W. S. Brooks and C. F. Underwood, during the expedition conducted by Dr. Barbour in the spring of 1922.

Other important additions are:— 40 specimens from Argentina collected by Mr. J. L. Peters (Dr. J. C. Phillips); 20 specimens from Victoria Land and the Alaska Peninsula, (Col. J. E. Thayer); about 50 specimens from China, (F. R. Wulsin Chinese expedition); 16 specimens from the Cameroons, (Mr. George Schwab); and 8 specimens from East Africa, (Mr. C. P. Curtis).

Single specimens or small series were received from Dr. G. M. Allen, the Animal Rescue League, the Brooklyn Museum, Dr. Thomas Barbour, Former Governor W. C. Forbes, Messrs. William Greenway, F. H. Kennard, A. W. Kidder, Mr. and Mrs. Amos Little, Dr. E. L. Mark, Messrs. George Nelson, T. E. Penard, J. L. Peters, A. S. Pope, G. M. Reed, Profs. H. W. Smith, and A. M. Tozzer.

Exchanges were made with the American Museum of Natural History, the Institute de la Salle, the United States National Museum, the University of Michigan, and Messrs. A. B. Howell, and N. Kuroda.

REPORT ON THE BIRDS.

BY OUTRAM BANGS.

During the year 2,326 specimens were received.

The most important additions are:— 658 specimens, 157 species and subspecies, collected in eastern Panama by Dr. Thomas Barbour, Messrs. W. S. Brooks and C. F. Underwood, 301 specimens collected in Anguilla, Saint Eustatius, Saint Christopher, and Nevis by Mr. J. L. Peters, and 174 specimens collected in Spain by Mr. F. Z. Cervera, all the gift of Dr. Thomas Barbour; 450 specimens (215 species and subspecies, 44 of which are new to the Museum collections) from the Philippines, collected by Former Governor W. C. Forbes and others, the gift of Mr. Forbes; 192 specimens from Shansi, China (F. R. Wulsin Chinese expedition); 93 specimens (13 new to the Museum collections) from the Cameroons (Mr. George Schwab).

Mr. T. E. Penard has presented the types of *Galbula surinamensis* and *Heteroglaucis philippinae*.

One hundred and nine specimens have been bought.

Small series or single specimens have been received from the Boston Society of Natural History, the Queensland Museum, Mr. Outram Bangs, Dr. Thomas Barbour, Mr. B. P. Clark, Former Governor W. C. Forbes, Messrs. G. E. Hodsdon, F. H. Kennard, William Malcolm, Dr. S. K. Patten, Mr. T. E. Penard, Dr. J. C. Phillips, Mr. A. C. Robbins, and Dr. W. M. Tyler.

Very many exchanges have been made and much material has been loaned.

Ninety genera new to the collection have been obtained.

Messrs. T. E. Penard and F. H. Kennard have assisted in the work.

REPORT ON THE REPTILES AND AMPHIBIANS.

BY THOMAS BARBOUR.

This year has been most satisfactory with respect to material received. Dr. E. R. Dunn has rearranged the whole series of alcoholic Chelonia, and finds that we have over forty of the fifty-seven genera recognized by Siebenrock.

In company with Mr. Winthrop S. Brooks, I spent several months during the spring of 1922 collecting in eastern Panama. We visited Cuba and Costa Rica as well. Mr. J. L. Peters visited the West Indies (Saint Eustatius, Nevis, Anguilla, and Saint Christopher) with good results. Since my previous report the collection of Rana has been revised, and we now have represented 123 species out of about 166 worthy of recognition. Mr. F. R. Wulsin's extensive travels in China have supplied many choice reptiles, the alligators being especially noteworthy.

By gift and purchase we have acquired two splendid additions to our African material, from Mr. Arthur Loveridge, of Tanganyika Territory, and from Mr. George Schwab of the Cameroons. Rich series from Argentina and Chile have come in as part of the results of the Phillips Expedition, Mr. J. L. Peters, collector, and an arrangement made with Don Carlos Reed has resulted in several fruitful journeys in the Cordilleran region. Several collections from Mexico, made by Mr. W. W. Brown, have been purchased; also collections from Southern China, made by Rev. John Graham, and from Siam, by Dr. Malcolm Smith, from Pontevedra and Valencia, Spain, by Mr. F. Z. Cervera; and arrangements have been made, of mutual advantage, with the Rev. Brothers Apolinar Maria, Nicéforo Maria and other clerics in South America.

Welcome gifts have been received from Dr. A. W. Sellards, Dr. H. W. Smith, Mr. Eugene Lieder, Mr. F. P. Dillon, Prof. M. L. Fernald, Prof. H. H. Wilder, Dr. E. R. Dunn, and Col. J.

Wall, Mr. L. C. Mowbray, Mr. Prescott Townsend, and the Philadelphia Zoölogical Gardens.

Exchanges have been made with Dr. Alipio de Miranda Ribeiro, the California Academy of Sciences, the American Museum of Natural History, the Zoölogical Museum of the University of Michigan, University of Otago, New Zealand, Natural History Museum, Basle, Switzerland, Albany Museum, Grahamstown, South Africa, Dominion Museum, Wellington, New Zealand, the University Museum of Berlin and the Natural History Museum of Vienna.

REPORT ON THE FISHES.

BY SAMUEL GARMAN.

The largest addition is a series of Chinese fishes collected by Mr. F. R. Wulsin. It contains many forms not heretofore represented in the Museum series.

Care of the collection has been generally distributed.

Many of the Museum specimens have valuable histories, and considerable time has been devoted to the restoration of partially illegible notes.

The possession of numerous duplicates has permitted anatomical work.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

BY NATHAN BANKS.

Useful additions to the collection were received from Miss E. B. Bryant, and Messrs. C. F. Baker, M. W. Blackman, W. Clench, T. D. A. Cockerell, J. W. Folsom, C. A. Frost, R. H. Howe, Jr., C. W. Johnson, A. C. Kinsey, C. S. Ludlow, W. L. McAtee, J. McDunnough, R. Marshall, A. P. Morse, R. J. Tillyard, and Jesse Williamson. The collection of termites of the late Prof. C. B. Thompson has been given by Wellesley College.

Small exchanges have been made with the U. S. National Museum and the Canadian National Museum.

Mr. Malloch has identified the unnamed Sapromyzidae, Mr. Williamson examined Celithemis, Mr. Dohanian part of the Ichneumoninae; the unnamed Fulgoridae have been sent to Mr. Metcalf, the Chrysididae to Mr. Taylor, and the Malayan Blattidae to Mr. Caudell.

Part of the Parish Brazilian Neuroptera, and the recent additions from Mr. Baker from the Philippines, have been determined and the new species described.

Neuroptera have been named for the U. S. National Museum, U. S. Biological Survey, Canadian National Museum, University of California, Kansas Agricultural College, University of Michigan Museum, Essex Institute, Ohio State University, and Pennsylvania Department of Agriculture. Fossorial Hymenoptera were named for the Mississippi Agricultural Experiment Station, Mr. A. P. Morse, and Prof. O. Stevens.

A new classification of the Myrmeleonidae has been completed.

Collector labels for a part of the Morse Orthoptera, species labels for several families of Diptera, and locality labels for several thousand exotic insects, have been supplied. By a rearrangement of the Formicidae, Chalcidae, and Cynipidae in Schmitt boxes,

Museum drawers became available for the Neuroptera, and several families of these have been transferred. This method will bring together the Neuroptera, and provide safe boxes for the Banks Diptera. Yet every rearrangement shows forcibly the ever increasing need for additional Museum drawers. The Hemiptera of the Morse and Banks collections have been united with the Museum material, and many miscellaneous Odonata identified.

Besides many visits from local entomologists, thirteen persons have studied parts of the collection.

REPORT ON THE MYRIOPODS, ARACHNIDS, AND WORMS.

BY RALPH V. CHAMBERLIN.

During August, the Curator engaged in field-work in Utah.

In continuing the study of spiders from the western United States and from Louisiana and Texas, a revision of the Gnaphosidae, as represented in North America, was prepared and a synopsis sent to press. The genus *Mimetus* was revised. In conjunction with these studies, particular thanks are due to Profs. W. M. Barrows, C. R. Crosby, and Mr. S. C. Bishop, for loans and gifts. Additional material from Louisiana was received from Mr. H. E. Hubert, and the new forms found in this and several other collections from the South were described and included in a paper on New North American and Chinese spiders. A short time was given to work on the Aviculariidae.

Prof. C. F. Baker made substantial additions to the collection of Philippine arachnids previously sent for identification. An important accession to the collection of myriopods includes, in addition to a series of 247 species, the types of 162 species described by Dr. Graf Carl Attems; of these types 145 are diplopods, and 17 chilopods. Important additions were received by exchanges with Dr. H. Brolemann, and with Capt. Gilbert Archey who sent paratypes of most of the chilopods described by him. A report was made upon the myriopods secured by the expedition of the California Academy of Sciences to the islands of the Gulf of California. Some further study was made of the North American Julidae, and a beginning was made in work upon the diplopods of Mexico. Minor collections were received for identification from the American Museum of Natural History, the U. S. Biological Survey, the Illinois Horticultural Board, and the U. S. Bureau of Entomology.

A collection of annelids from the Pacific Coast was received for identification from the United States National Museum.

For various gifts of material, the department is indebted to Messrs. C. N. Ainslie, G. G. Ainslie, Gilbert Archey, C. F. Baker, H. Brolemann, J. C. Chamberlin, G. Grant, W. Henderson, H. E. Hubert, A. L. Quaintance, H. L. Sanford, E. R. Sasscer, V. M. Tanner, and C. A. Thomas.

REPORT ON THE ECHINODERMS.

BY HUBERT LYMAN CLARK.

A considerable part of the year has been given to the study of important collections from Australia, and a report has been prepared on the echinoderms from the Abrolhos Islands, West Australia, collected by Prof. W. J. Dakin. Some time was given to preparing reports on two small collections of holothurians belonging to the Canadian Geological Survey. A collection of echinoderms from the Lower California region, made by the ALBATROSS in 1911, was studied for the American Museum of Natural History, and a report on the same has been submitted. A small collection of sea-stars, brittle-stars, and sea-urchins from the Challenger Bank, Bermuda, proved of so much interest that a report was prepared and published.

More time than usual was given to the care and cleaning of the collections, especially the dry Echini, which were all thoroughly dusted.

The accessions consisted of 221 specimens of 95 species, and 68 genera. Of these, 8 species and 2 genera, all sea-stars, were not previously in the collection. The chief sources of this material were the American Museum of Natural History, the Bermuda Biological Station, Prof. E. L. Mark, Director, and Prof. W. J. Dakin of Liverpool. Other donors to whom thanks are due are the Bishop Museum, Honolulu, the Naturhistoriska Riksmuseum, Stockholm, Prof. Madoka Sasaki, Sapporo, Japan, Dr. R. P. Cowles, Dr. W. K. Fisher, and Dr. R. T. Jackson.

REPORT ON THE COELENTERATES.

BY HENRY B. BIGELOW.

A series of fresh-water Medusae from Bass Lake, Indiana, presented by Prof. F. Payne, and others from Florida, collected by Mr. George Nelson, deserve mention.

A large collection of Medusae from Chesapeake Bay, (U. S. Bureau of Fisheries), and smaller series from the Bay of Fundy, (Canadian Biological Station at St. Andrews), have been received for study and report.

The preparation of a comprehensive account of the biology and oceanography of the Gulf of Maine, (*cf.* Report M. C. Z., 1920-1921, p. 25), has occupied my time throughout the year. The sections on phyto- and zoöplankton are complete; that on fishes, well advanced, leaving the chapters on hydrography to be prepared.

I have continued a general oversight of the scientific program of the International Ice Patrol of the Grank Banks, Lieut. E. A. Smith and Mr. E. F. B. Fries caring, respectively, for the collection of the physical and biological data gathered on the February-July cruises. Arrangements have been made for the study of these collections by Lieut. Smith and Mr. Fries, as members of the Graduate School of Harvard University.

According to a plan of the International Committee on Marine Fishery Investigations, the HALYCON set about 1200 ocean drift bottles afloat on lines normal to the coast off Cape Elizabeth, off Cape Cod, and off Sandy Hook, during the early summer of 1922. While it is too early to plot the results, so considerable a percentage of the bottles have already been recovered, that a valuable addition to our knowledge of the ocean currents of this region is anticipated.

REPORT ON INVERTEBRATE PALAEONTOLOGY.

BY P. E. RAYMOND.

The Curator spent the greater part of the year in the identification and labeling of the contents of the 16 boxes of fossils collected during the Shaler Memorial Expedition of 1921. One of the important items is the large series of well-preserved Cambrian fossils from northeastern Alabama, representing about 25 species, all new to the collection. Among them is the pygidium of a trilobite retaining its color-pattern, a specimen unique among trilobites, and also the most ancient known example of a fossil showing color-markings.

The material obtained from the Ordovician of eastern Tennessee and northern Alabama supplements that of the two former trips to the Appalachians, so that the little-known Ordovician faunas of the Great Valley from Pennsylvania to Alabama are now well represented. This collection contains many undescribed species, some of which have been studied. Articles descriptive of the sponges and trilobites have been prepared by the Curator, and Mr. Bradford Willard has undertaken the study of a part of the brachiopods. The fossils from central Tennessee and central Kentucky led to a reconsideration of the correlation of the Ordovician strata of the two areas, and a paper by the Curator, proposing a new scheme, is now being published in the Bulletin of the Geological Society of America.

Mr. T. H. Clark has continued his work in the vicinity of Quebec and Lévis, and has presented the Museum with 42 drawers of Ordovician and 7 of Devonian fossils, the greater part of which he has identified and labeled. Many of these proved to be new to science. His most notable specimen is a small appendage of a trilobite, presenting some features previously unknown in the group. This he has recently described in the American Journal of

Science. A very important and welcome addition to the collection of graptolites is his large series of well-preserved specimens, from the typical locality of the Lévisian. This horizon and locality was quite unrepresented in the Museum before Mr. Clark began this work.

Other accessions during the year have been the following donations: 3 lots of Palaeozoic fossils from Yunan, China, (Mr. J. Graham), through Dr. Thomas Barbour; 5 lots of Lower Ordovician fossils from British Columbia, (Mr. F. P. Shepard); 5 boxes Ordovician fossils from southern Quebec, (Mr. J. H. Bradley, Jr.); and two drawers of Pleistocene shells from Nantasket, Mass., (Mr. T. H. Clark). The Curator made a small collection of Lower Cambrian fossils in Washington Co., N. Y.

REPORT ON THE GEOLOGICAL COLLECTIONS.

BY R. W. SAYLES.

During the past year the collections have been added to mainly by purchases. Most of the specimens purchased were sedimentary rocks, illustrating phases of sedimentation. Several very fine examples of opalized wood were acquired. A striking specimen, illustrating concentric jointing, was given by Professor Raymond. Mr. Hugh Nawn gave three very good specimens of fossil tree trunks from the famous Devonian fossil forest discovered by James Hall, at Gilboa, in the upper Schoharie valley in 1870.

In September, a trip was made to Quebec. In the company of Mr. T. H. Clark, the Beekmantown conglomerates at Levis were examined and studied. A bed of tillite of the sublacustrine type was found by the writer in the cliff at Levis. The enormous boulders of limestone, the shapes of the included rock fragments, and the structure of the matrices of these conglomerates, would seem to preclude anything but ice action in their origin.

In July, the writer, in company with Mr. Arthur Keith of the U. S. Geological Survey, Prof. Charles Schuchert of Yale University, and Prof. A. C. Swinnerton of Antioch College, spent two weeks studying the rocks of Vermont. The Cambrian and Ordovician formations near St. Albans were investigated. The Swanton conglomerate of Trenton age was studied. One boulder measured 170 feet long by 100 feet wide, another 140 feet long and about 70 feet wide, and another 60 feet long, 30 feet wide, and about 25 feet thick. No known agency but glacial ice could move these boulders to their present positions.

REPORT ON THE LIBRARY.

During the Museum year from August 1, 1921, to July 31, 1922, inclusive, 1,207 volumes, 1,732 parts of volumes, and 3,108 pamphlets have been added to the Library.

The total number of volumes in the Library is 59,846, the total number of pamphlets is 65,253.

One hundred and forty volumes have been bound; one thousand and eight hundred pamphlets have been separately bound.

The library of the late Dr. G. F. Becker constitutes the largest accession received during the year. A full statement concerning this library, together with a detailed account of the Brewster and Faxon bequests, is necessarily deferred until the next Report.

From the Harvard College Library, the Museum has received 243 titles; other contributors are Nathan Banks, (267 titles), Samuel Henshaw, (143 titles), W. M. Davis, (91 titles), Outram Bangs, (71 titles), L. A. Shaw, (70 titles), L. R. Reynolds, (40 titles) H. B. Bigelow, (38 titles), Peabody Museum of American Archaeology and Ethnology, (32 titles).

PUBLICATIONS

FOR THE YEAR 1921-1922.

(1 AUGUST, 1921 — 31 JULY, 1922).

MUSEUM OF COMPARATIVE ZOÖLOGY.

BULLETIN: —

Vol. LVII.

No. 6. Further studies on North American Lithobiidae. By Ralph V. Chamberlin. 126 pp. 12 plates. June, 1922.

Vol. LXV.

No. 1. A new fossil cetacean. By G. M. Allen. 14 pp. 1 plate. August, 1921.

No. 2. New genera and species of Aleocharinae with a polytomic synopsis of the tribes. By Adalbert Fenyès. 22 pp. October, 1921.

No. 3. The holothurians of the genus *Stichopus*. By Hubert Lyman Clark. 38 pp. 2 plates. February, 1922.

No. 4. Notes on Philippine birds collected by Governor W. Cameron Forbes. By Outram Bangs. 10 pp. April, 1922.

No. 5. Exploration of the coastal water off the northeastern United States in 1916 by the U. S. fisheries schooner *Grampus*. By Henry B. Bigelow. 104 pp. July, 1922.

MEMOIRS: —

Vol. XLVII.

No. 3. *Spaerodactylus*. By Thomas Barbour. 64 pp. 26 plates. December, 1921.

REPORT: —

1920-1921. 39 pp. December, 1921.

ALLEN, G. M.

Fossil cetaceans from the Florida phosphate beds. *Journ. mammalogy*, August, 1921, **2**, p. 144-159, pl. 9-12.

A new horseshoe bat from West Africa. *Revue zool. Afric.*, 1921, **9**, p. 193-196.

Bats from Palawan, Philippine islands. *Occ. papers Mus. zööl. Univ. Mich.*, 25 February, 1922, no. 110, p. 1-5.

See p. 23. *Bull.* **65**, no. 1. Also with Thomas Barbour, *Journ. mammalogy*, May, 1922, **3**.

BANGS, OUTRAM.

The name of the eastern hermit thrush. [With T. E. Penard]. *Auk*, July, [September], 1921, **38**, p. 432-434.

The black-backed Kamchatkan wagtail, *Motacilla lugens* Kittlitz, in Alaska. [With J. E. Thayer]. *Auk*, July, [September], 1921, **38**, p. 460.

The birds of the American Museum of Natural History's Asiatic zoölogical expedition of 1916-1917. *Bull. Amer. mus. nat. hist.*, 30 December, 1921, **44**, p. 575-612.

A new form of *Edolius forficatus* (Linné). [With T. E. Penard]. *Proc. N. E. zööl. club*, 1 May, 1922, **8**, p. 25-26.

The northern form of *Leptotila fulviventris* Lawrence. [With T. E. Penard]. *Proc. N. E. zööl. club*, 8 May, 1922, **8**, p. 29-30.

See also p. 23. *Bull.* **65**, no. 4.

BANKS, NATHAN.

New Californian spiders. *Proc. Cal. acad. sci.*, 29 September, 1921, ser. 4, **11**, p. 99-102.

South American Glenurus and some other Myrmeleonidae. *Canad. ent.*, March, 1922, **54**, p. 58-60.

Venational variation in Raphidia. *Canad. ent.*, May, 1922, **54**, p. 114-116.

BARBOUR, THOMAS.

Spiders feeding on small cyprinodonts. *Psyche*, August, 1921, **28**, p. 131-132.

On a small collection of reptiles from Argentina. *Proc. Biol. soc. Washington*, 17 August, 1921, **34**, p. 139-142.

Aquatic skins and arboreal monitors. *Copeia*, 31 August, 1921, no. 97, p. 42-44.

A new Phrynosoma from Cerros island. *Proc. N. E. zööl. club*, 7 September, 1921, **7**, p. 113-116.

The Florida pine snake. *Proc. N. E. zööl. club*, 22 October, 1921, **7**, p. 117-118.

Herpetological novelties. [With E. R. Dunn]. *Proc. Biol. soc. Washington*, 21 December, 1921, **34**, p. 157-162.

Review of Blanchard's Revision of the king snakes. *Copeia*, 20 March, 1922, no. 104, p. 20-22.

The white-tailed deer of eastern United States. [With G. M. Allen]. *Journ. mammalogy*, May, 1922, **3**, p. 65-78, pl. 4-5.

Rattlesnakes and spitting snakes. *Copeia*, 20 May, 1922, no. 106, p. 36-38.

An annotated list of the Amphibia and Reptilia of Jamaica. Cundall: The handbook of Jamaica, 1922, p. 666-669.

See also p. 23. *Mem.* **47**, no. 3.

BIGELOW, H. B.

See p. 23. *Bull.* **65**, no. 5.

CHAMBERLIN, R. V.

On some chilopods and diplopods from Knox Co., Tennessee. *Canad. ent.*, October, 1921, **53**, p. 230-233.

On some arachnids from southern Utah. *Canad. ent.*, November, 1921, **53**, p. 245-247, pl. 10 (pl. 10, p. 246).

A new lithobiid of the genus *Paobius*. *Canad. ent.*, February, 1922, **54**, p. 47-48.

A new schendyloid chilopod from Mexico. *Psyche*, February, 1922, **29**, p. 9-10.

A new diplopod from British Guiana taken at quarantine at Philadelphia. *Ent. news*, March, 1922, **33**, p. 85-86.

A new platydesmoid diplopod from California. *Journ. ent. & zool.*, March, 1922, **14**, p. 9-10.

Further notes on the nomenclature of North American Julidae and Nemasomidae. *Proc. Biol. soc. Washington*, 20 March, 1922, **35**, p. 7-10.

Two new American arachnids of the order Pedipalpida. *Proc. Biol. soc. Washington*, 20 March, 1922, **35**, p. 11-12.

A new milliped of the genus *Polyxenus* from the Florida keys. *Ent. news*, June, 1922, **33**, p. 165.

The North American species of *Mimetes*. *Journ. ent. & zool.*, July, 1922, [March, 1923], **15**, p. 3-9.

The centipeds of Central America. *Proc. U. S. nat. mus.*, 1922, **60**, art. 7, 17 pp., 4 pls.

The millipeds of Central America. *Proc. U. S. nat. mus.*, 1922, **60**, art. 8, 75 pp., 25 pls.

Notes on West Indian millipeds. *Proc. U. S. nat. mus.*, 1922, **61**, art. 10, 19 pp., 6 pls.

See also p. 23. *Bull.* **57**, no. 6.

CLARK, H. L.

Studies of the development and larval forms of echinoderms.

By Th. Mortensen. [Review]. *Science*, 21 April, 1922, **55**, p. 431-433.

The echinoderms of the Challenger Bank, Bermuda. *Proc. Amer. acad. arts & sci.*, June, 1922, **57**, p. 351-361, pl. 1.

See also p. 23. *Bull.* **65**, no. 3.

PHILLIPS, J. C.

Conservation of our mammals and birds. *Harvard grad. mag.*, September, 1921, **30**, p. 36-52.

The status of certain ducks at Wenham Lake. *Bull. Essex county ornith. club*, December, 1921, p. 19-33.

RAYMOND, P. E.

A new fossil starfish from New England. *Proc. Boston soc. nat. hist.*, August, 1921, **36**, p. 165-170, pl. 3.

Criteria for species, phylogenies, and faunas of trilobites. *Bull. Geol. soc. Amer.*, September, 1921, **32**, p. 349-352.

The history of corals and the "limeless" ocean. *Amer. journ. sci.*, December, 1921, ser. 5, **2**, p. 343-347.

Seaside notes. *Amer. journ. sci.*, February, 1922, ser. 5, **3**, p. 108-114.

The Ceratopyge fauna in western North America. *Amer. journ. sci.*, March, 1922, ser. 5, **3**, p. 204-210.

SAYLES, R. W.

Possible tillite at Levis, Quebec. (Abstract). *Bull. Geol. soc. Amer.*, March, 1922, **33**, p. 99-100.

Preliminary notes on some regularly banded argillites which suggest seasonal deposition. (Abstract). *Bull. Geol. soc. Amer.*, March, 1922, **33**, p. 133.

The dilemma of the paleoclimatologists. *Amer. journ. sci.*, June, 1922, ser. 5, **3**, p. 456-473.

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE.

Gray Fund	\$50,000.00
Permanent Fund	117,469.34
Humboldt Fund	9,397.15
Sturgis Hooper Fund	108,476.69
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Virginia Barret Gibbs Fund	8,043.15
Willard Peele Hunnewell Memorial Fund	5,605.49
Maria Whitney Fund	7,381.67
Alexander Agassiz Fund	99,500.00
Alexander Agassiz Expedition Fund	96,950.91
George Russell Agassiz Fund	50,000.00
George Russell Agassiz Fund. Special	50,000.00
Maria Whitney and James Lyman Whitney Fund	770.46
Louis Cabot Fund	6,011.46
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	\$915,133.43

The payments on account of the Museum are made by the Bursar of Harvard University, on vouchers approved by the Director. The accounts are annually examined by a committee of the Overseers. The only funds the incomes of which are restricted, the Gray, the Humboldt, the Whitney, the Louis Cabot, and the Alexander Agassiz Expedition Funds, are annually charged in an analysis of the accounts, with vouchers, to the payment of which the incomes are applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt Fund (about \$460.) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Woods Hole, the Stations at Bermuda, or the Tortugas.

The income of the Whitney Funds can be applied for the care (binding) and increase of the Whitney Library.

The income of the Louis Cabot Fund can be applied to the purchase of books on travel, sport, and natural history.

The Alexander Agassiz Expedition Fund was bequeathed by Alexander Agassiz for the publication of reports on collections brought together by the expeditions with which he was connected.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$325., is assigned annually with the approval of the Faculty of the Museum, on the recommendation of the Professors of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who may have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."

Applications for the tables reserved for advanced students at the Woods Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

The following Publications of the Museum of Comparative Zoölogy are in preparation:—

Reports on the Results of Dredging Operations in 1877, 1878, 1879, and 1880, in charge of ALEXANDER AGASSIZ, by the U. S. Coast Survey Steamer "Blake," as follows:—

- A. MILNE EDWARDS and E. L. BOUVIER. The Crustacea of the "Blake."
A. E. VERRILL. The Alcyonaria of the "Blake."

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieutenant Commander Z. L. TANNER, U. S. N., Commanding, in charge of ALEXANDER AGASSIZ, as follows:—

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| K. BRANDT. The Sagittae. | W. A. HERDMAN. The Ascidians. |
| K. BRANDT. The Thalassicolae. | S. J. HICKSON. The Antipathids. |
| O. CARLGREN. The Actinarians. | E. L. MARK. Branchiocerianthus. |
| W. R. COE. The Nemerteans. | JOHN MURRAY. The Bottom Specimens. |
| REINHARD HOHRN. The Eyes of Deep-Sea Crustacea. | P. SCHIEMENZ. The Pteropods and Heteropods. |
| H. J. HANSEN. The Cirripeds. | THEO. STUDER. The Alcyonarians. |
| H. J. HANSEN. The Schizopods. | H. B. WARD. The Sipunculids. |

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of ALEXANDER AGASSIZ on the U. S. Fish Commission Steamer, "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding, as follows:—

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| — The Volcanic Rocks. | G. O. SARS. The Copepods. |
| — The Coralliferous Limestones. | L. STEJNEGER. The Reptiles. |
| G. W. MÜLLER. The Ostracods. | T. W. VAUGHAN. The Corals, Recent and Fossil. |
| MARY J. RATHBUN. The Crustacea Decapoda. | |

PUBLICATIONS
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to LIV., LVI., and LVIII. to LXIV.; of the MEMOIRS, Vols. I. to XLII., and also XLIV. to XLVI., and XLVIII.

Vols. LV., LVII. and LXV. of the BULLETIN, and Vols. XLIII., XLVII. and XLIX. of the MEMOIRS, are now in course of publication.

The BULLETIN and MEMOIRS are devoted to the publication of original work by the Officers of the Museum, of investigations carried on by students and others in the different Laboratories of Natural History, and of work by specialists based upon the Museum Collections and Explorations.

The following publications are in preparation:—

Reports on the Results of Dredging Operations from 1877 to 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., commanding.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieut. Commander Z. L. Tanner, U. S. N., commanding, in charge of Alexander Agassiz.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding.

Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from October, 1904, to April, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding.

These publications are issued in numbers at irregular intervals. Each number of the Bulletin and of the Memoirs is sold separately. A price list of the publications of the Museum will be sent on application to the Director of the Museum of Comparative Zoölogy, Cambridge, Mass.